LECTURE

1

TELEMATIC SYSTEMS AND THEIR DESIGN - part Systems COURSE INTRODUCTION

Course content

- Definitions of telematic, Telecommunication environment for telematics,
- ITS architecture, ITS organizations, ITS standardization bodies,
- Global navigation satellite systems - GALILEO
- Electronic fee collection systems - details
- E-call, Traffic information systems
- Cooperative systems,
- Railway telematics,
- Water Telematics, Air Telematics

Today‘s topic

- What is meant by telematics
- What you know from telematics
- Typical applications

Telematics, intelligent transport systems

- Word TELEMATICS has been first used in 1978 by Simon Nora and Alain Minc in their report titled L'Informatisation de la société (The Computerization of Society)
- Origin in words TELEcommunication and inforMATICS

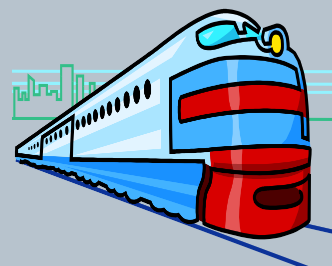
- Similar meaning as Intelligent transport systems
  - telematics – term used mainly in Europe
  - ITS – term used mainly in USA

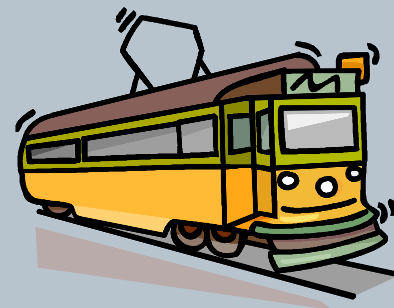
Transport telematic motivation

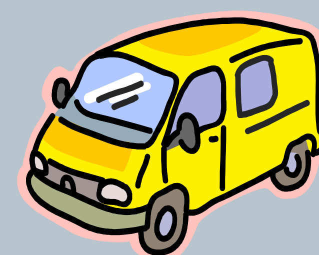
- Decreasing traffic congestions, decreasing travel times
- Increasing safety
- Environmental protection, fuel saving
- Increasing effectiveness of goods transport

Usage of transport telematics

- all means of transport



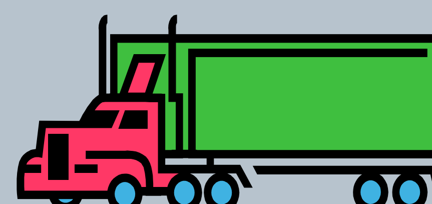




- Motto:

  „You can

m, you must build it.“



Telematic applications overview

Road telematics

- Traffic control – intersections, areas, highways
- Public transport priority
- Parking systems
- Intelligent highway
- Intelligent vehicle
- Goods transport
- Electronic fee collection

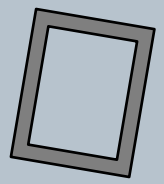
Traffic control in cities

Trafic signals

Video-detection

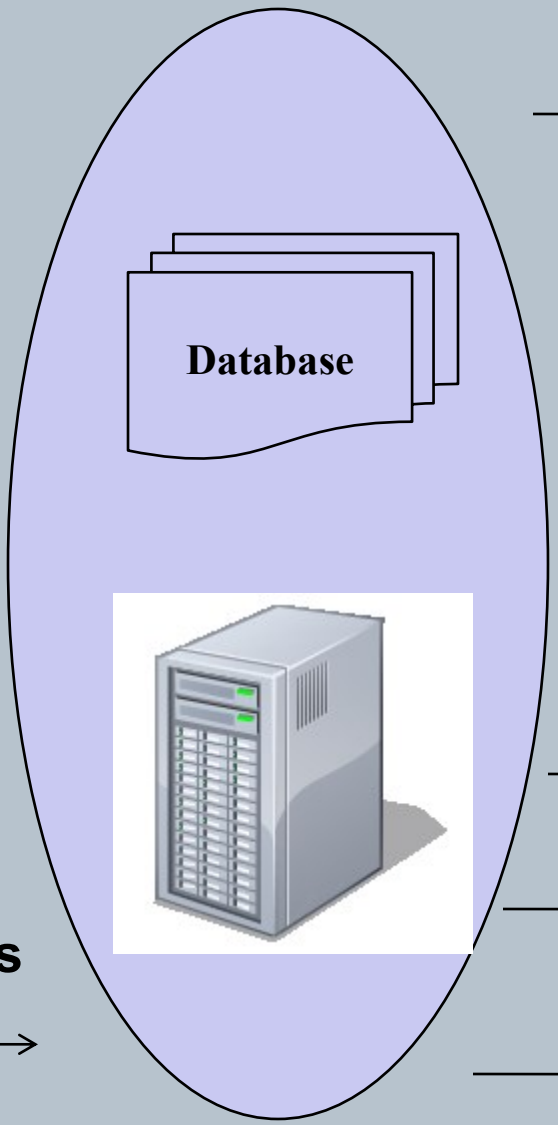
Inputs

Parking information



Inductive loop detectors

Accidents reports



Outputs

Trafic signals

Variable message signs

Parking navigation

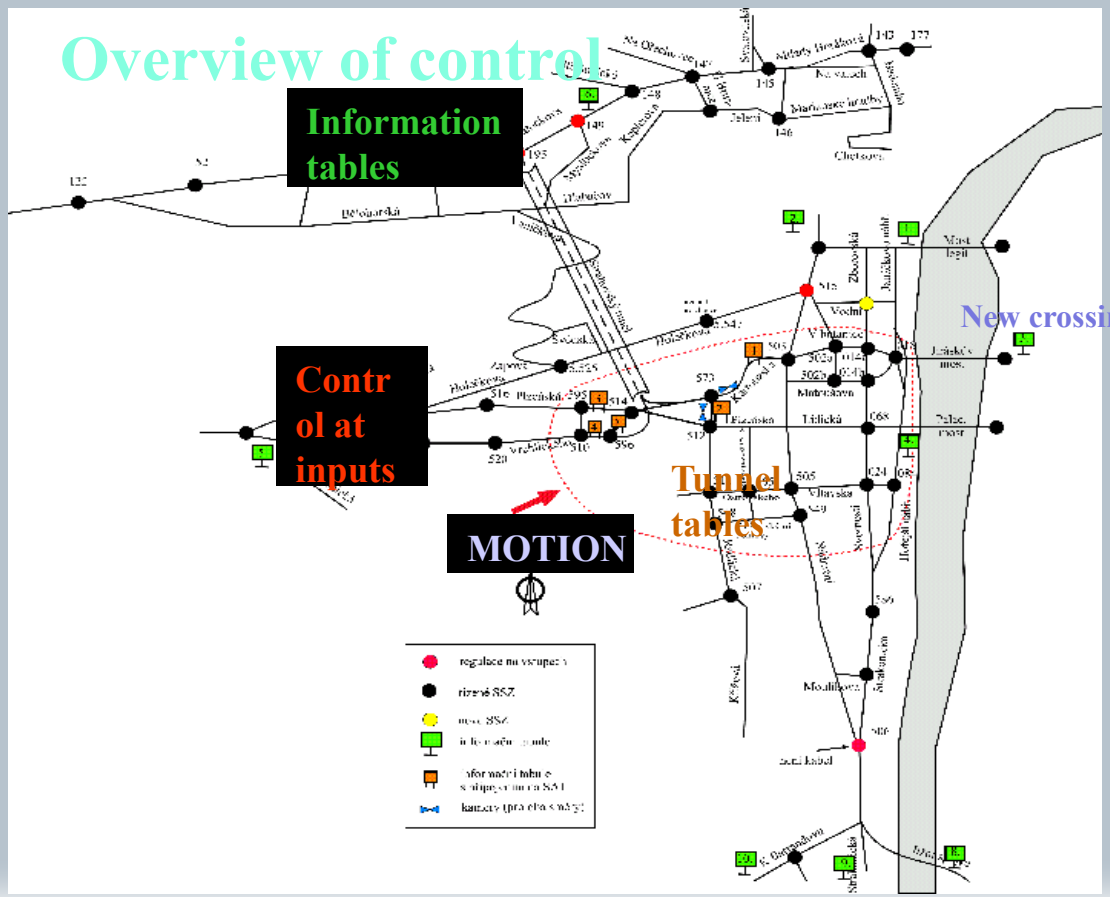
Public transport priority

Navigation

Fee collection

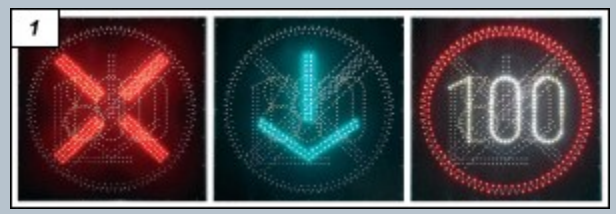
City traffic control

- Example – traffic control in Prague –MOTION system



Line traffic control

- Variable message signs
  - information (e. g. about weather, traffic situation, road maintenance)
  - directive (dynamical assignment of traffic lined, speed limits, etc.)



Line traffic control example

- Line traffic control at the Prague Ring

  Traffic control elements:
  - information portals (text messages)
  - portals for linear traffic regulation (speed limitation, no overtaking sign for trucks)
  - variable traffic signs
  - meteostation, traffic intensity counter, emergency phones, technological equipment of tunnel constructions, ...

Line traffic control example

- Prague Ring Road Traffic Control system evaluates on-line data from the traffic detectors
- Available regulation:
  - Speed limits (step 20 km/h).
  - Ban of truck traffic in the left traffic lane
  - Warning messages – icing, slippage, congestion, roadworks, etc.
- Example of usage:
  - After crossing particular traffic volume, when congestion may happen, the traffic speed will be gradually limited
  - Other telematic systems will react to the situation at the Ring road

Public transport priority

- Passive or active
  - Passive – the public transport vehicle is just detected
  - Active – public transport vehicle communicates with the control system
- Conditional or absolute
  - Conditional – e.g. based on the correspondence with the timetable
  - Absolute - always

Telematic applications in public transport

- Public transport preference
- Central metro control centre
- Diagnostic and remote control metro systems (fire detectors, video-supervision, etc.)
- Monitoring tram operation
- Monitoring bus operation (IRIS/IBIS – detection via radio beacon)
- Remote supervision of ticket vending machines
- SMS tickets

Travellers information at the public transport stops

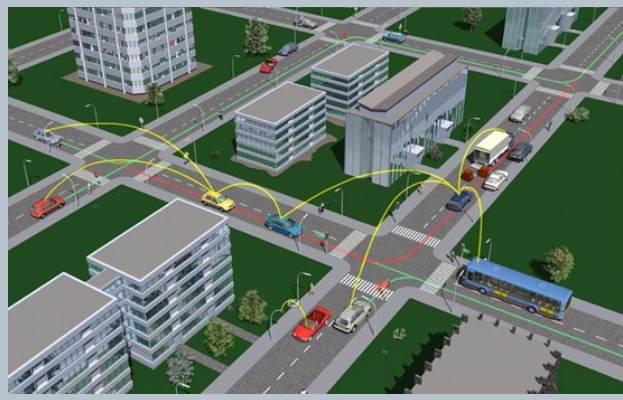
- System offers information for passengers about the arrival time of public transport vehicle
- Information are transmitted from traffic centre, based or reports of vehicles from previous stations, based on GPS

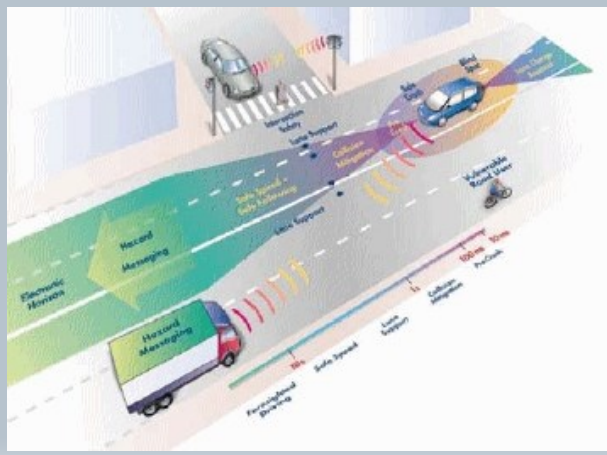
Parking systems

- Parking automata
- Park and Ride systems (P+R)
- Monitoring occupancy of parking places and dynamical navigation to the parking places
- Automated parking systems

Cooperative systems

- Based on vehicle-vehicle (V2V) of vehicle-infrastructure (V2I) communication
- Information transmitted via short-range communication
- Useful for e.g.:
  - Awareness about approaching emergency vehicle
  - Anti-collision warning systems – useful e.g. behind turnings, in fog, etc.



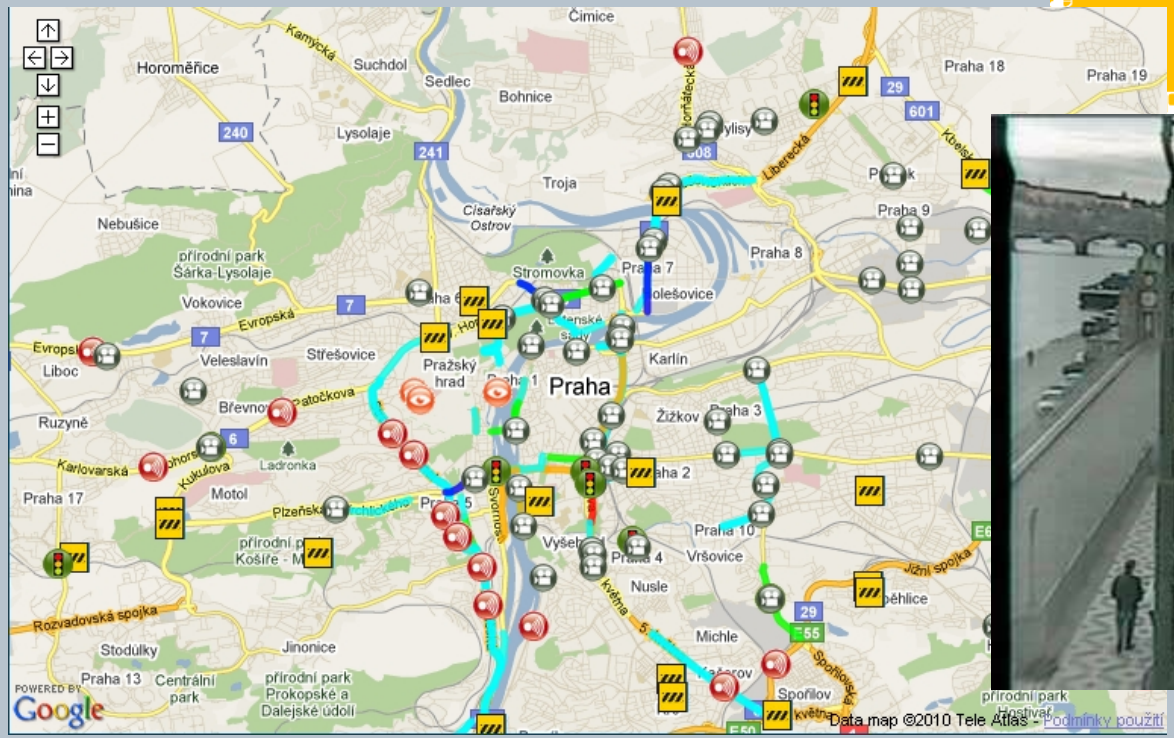


Information and navigation systems

- Navigation systems, dynamic navigation
- Safety systems – E-Call, monitoring of stolen vehicles, dangerous goods transport, etc.
- Active vehicle preference
- Electronic fee collection
- AVG - Automated Vehicle Guidance
- Traffic modelling – using floating cars
- Fleet management

Telematic applications in Prague transport

- Traffic cameras
- Weather sensors
- List of traffic restrictions



Infrastructure equipment – e.g. meteo stations accompanying roadways

- Road Weather Information System
- Meteo-stations interconnected with Czech Hydrometeorological institute in Prague
- Systems works with thermal maps technology
- Forecast for next 24 hours

Fleet management systems

- Position monitoring and control
- Route optimization
- Vehicle condition monitoring
- Cargo condition monitoring (e.g. temperature)


Source: Avante company

Vehicle systems

- Systems for active/passive safety
- Adaptive Cruise Control ACC
- Lane Departure Warning System LDWS
- Night vision – using IR camera
- Adaptive Forward Lighting
- Micro-sleep detection

Source: autoweb.cz

Inteligent vehicle

- Driver support systems
- Automatic distance control between vehicles
- Automatic parking systems
- Automatic cruise control
- Automatic guidance control
- Anti-collision systems

Electronic fee collection

- Basic technologies
  - DSRC (Dedicated Short Range Communication)
  - GNSS/CN
  - LSVA
- For different areas
  - Road network (e.g. highways)
  - City fee collection

Road tunnels

- Systems for traffic control in tunnels
- Fire safety systems
- Detection of traffic accidents and congestions
- Monitoring of velocities
- Connection to city traffic centre

More telematic systems

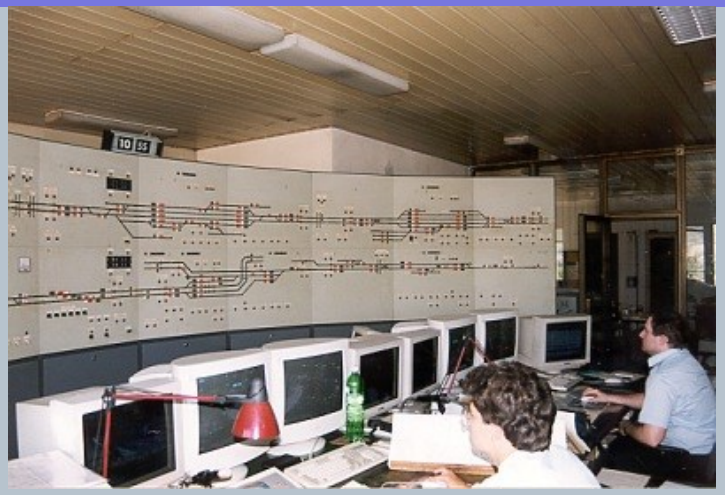
- Dangerous goods transport systems
- Weigh-In-Motion Measurement
- Systems for vulnerable road users
- Systems for disabled people
- Car-sharing systems
- Navigation systems

and many others

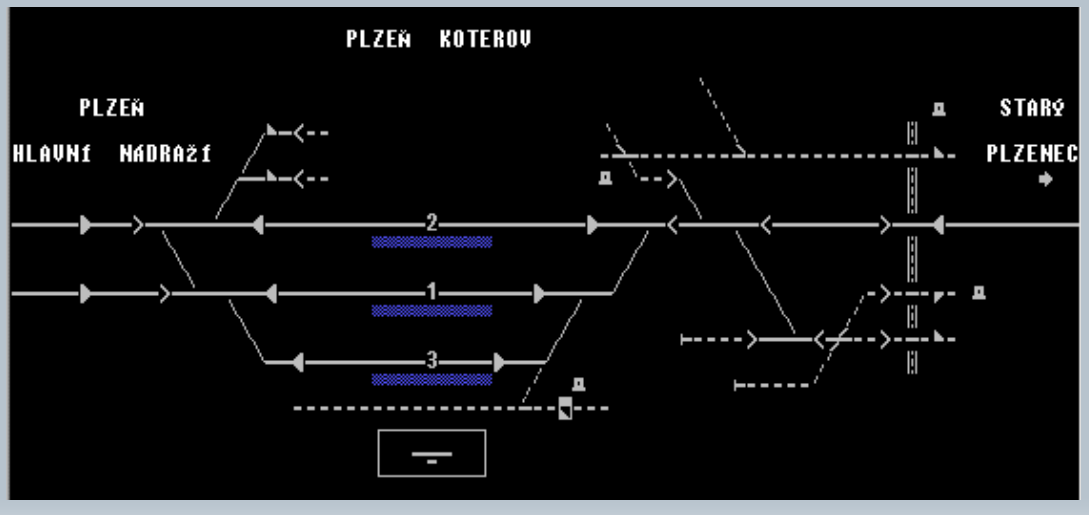
Railway telematics

- Interlocking remote control systems
- Graphic-technological control extension
- ERTMS (European Railway Traffic Management System)
  - ETCS
  - GSM-R
- Automatic train operation

Interlocking systems for remote control



- Graphic-technological control extension

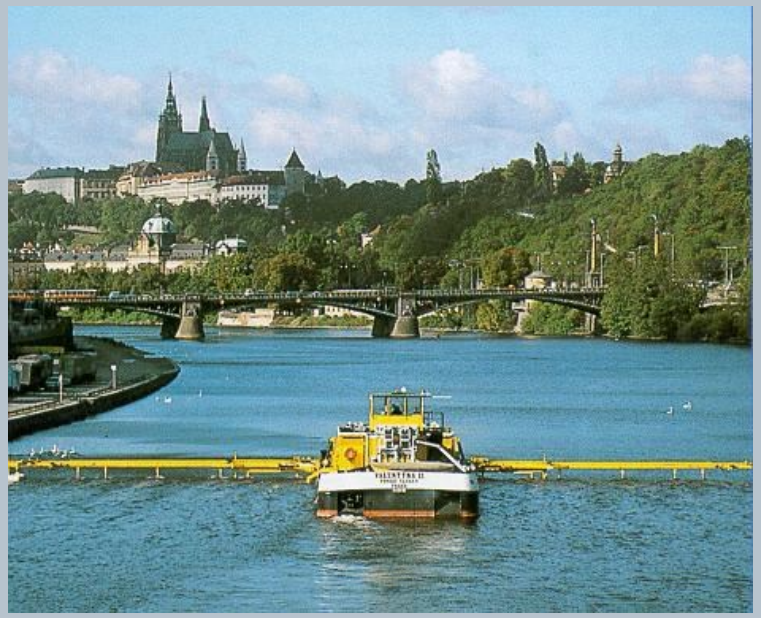


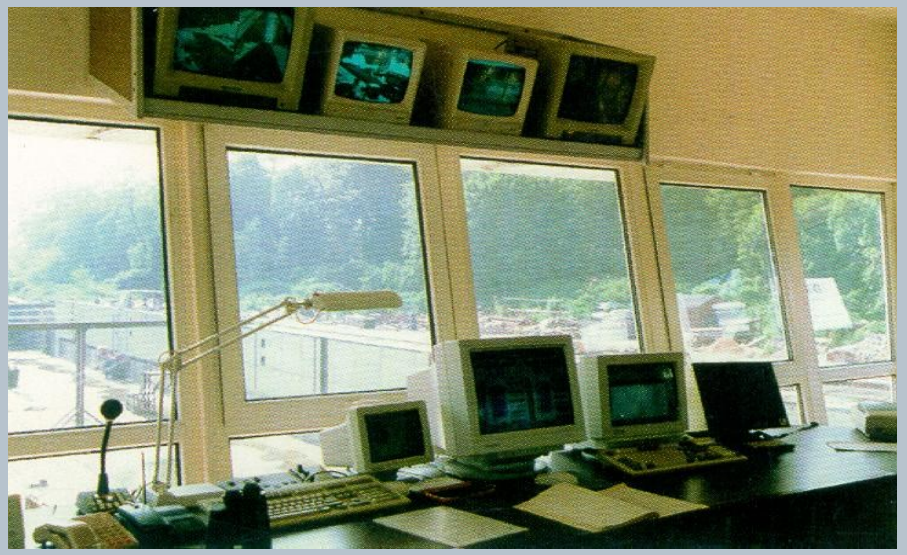
Telematics for water transport

- Information and navigation
- Automatic port ship handling
- Collision avoidance systems

Examples of water telematic applications in the CR

- Lock chamber control
- Metering ship „Valentýna“
- DAKOSY – shipping flow control



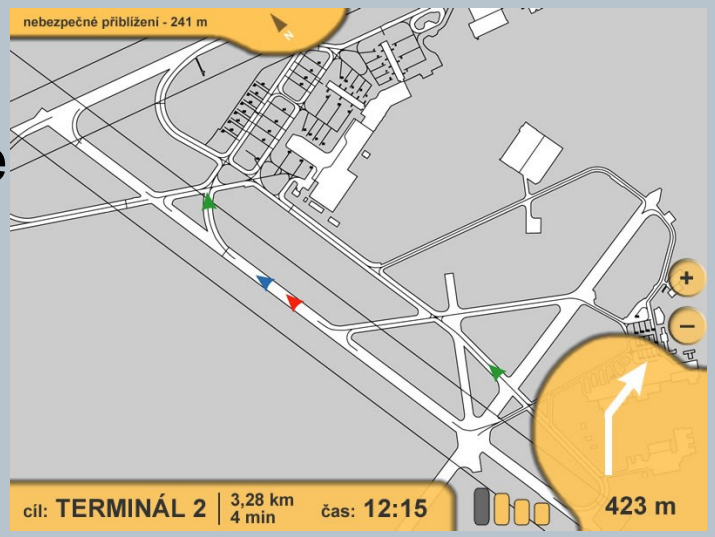


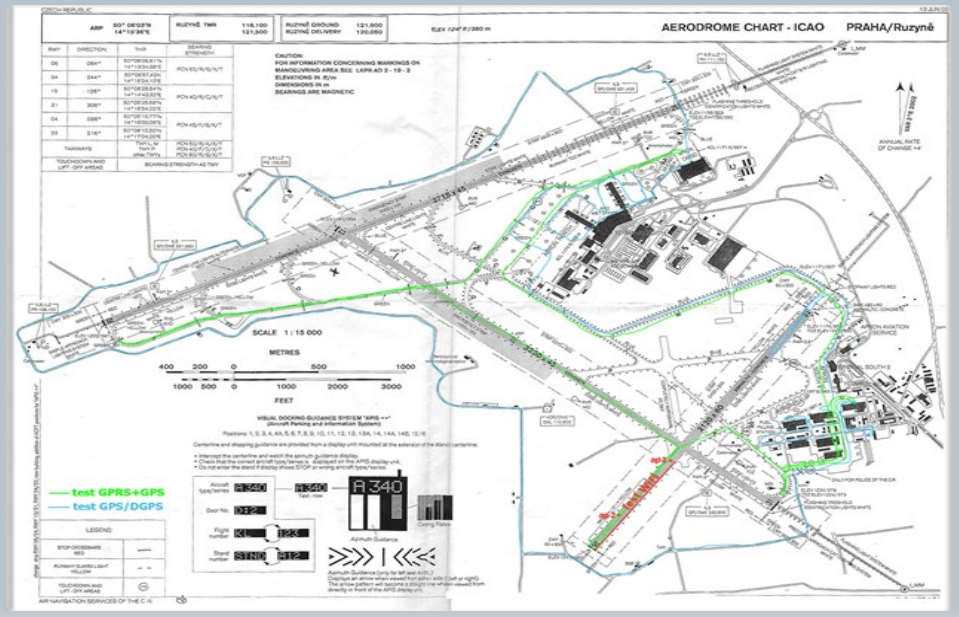
Telematics for air transport

Prague airport

Example of telematic application developed at FTS

Project Monitoring and control of moving objects at the airport surface





Thank you for your attention

Source: www.fastmotoring.com
Kuala Lumpur, Malaysia